SMALL SCALE LNG PROSPECTS

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WHY SMALL SCALE LNG?

- Construction costs of large-scale liquefaction plants have zoomed from $200 per ton-year of capacity to more than $500 per ton-year
- Will help in the development of remote gas fields too small for large-scale liquefaction
- Can continue with gas distribution where pipeline distribution has ended

WHY SMALL SCALE LNG? Cont’d)

- Can be used as peak shaving for LDC’s
- As transportation fuel
- For offshore liquefaction, which has been viewed as a desirable alternative to large land-based units (a theoretical application for now)
- Technology can be borrowed to turn landfill gases to liquid fuel

Projects around the World

There are at least a dozen projects ranging from one million to one-hundred million cubic feet per day (7,000 to 700,000 metric tons per year) under development around the world

Some of them are:

MARINTEK PROJECTS

MARINTEK has performed a number of projects and carried out several conceptual developments related to the distribution and use of LNG
- The challenge of the conceptual development was to establish a financially viable solution, so that LNG could become cost-competitive with alternatives such as fuel oils. This could make natural gas available in regions with lower levels of demand than are commercially viable with pipelines or larger ships.

MARINTEK PROJECTS CONT’D

- The concept as developed is commercially robust, as the main investments are the ships and the modularised storage facilities. The number of ships and the capacity of each storage facility can be adapted as time goes on, to meet the development of the demand for natural gas
- Committed investment costs could thus be kept to a minimum while scaling options are retained.
Kryopak, Inc.

Kryopak, Inc. is a cryogenic plant manufacturer, specializing in the design, engineering, and production of skid mounted Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG) plants.

- In 2004 Kryopak was awarded a 7 MMSCFD, (130-metric-ton-per-day) LNG plant, to provide LNG for power generation and various other energy-related projects for Beihai XinAo Gas Company Ltd., which is operating on Weizhou Island, Peoples Republic of China.

Kryopak, Inc. cont’d

- In 2005 Kryopak was awarded a 10 MMSCFD (a 200 metric ton per day LNG) plant to serve as a power-generation source for Energy Development Limited, which is expected to be operating in Karratha, Western Australia at the end of 2006.

Max Universal

Max Universal is an engineering firm that designs small-scale (2MMscfd to 200MMscfd) LNG facilities including liquefaction, storage, loading/unloading and vaporization.

Prometheus Energy Company

- Prometheus Energy, is a project developer with five small-scale (40,000 ton per year) LNG projects in three countries. The company is using standard designs to keep capital and operating costs low to create a network of supply points heavy-duty LNG-powered transportation fleets.

Idaho National Laboratory (INL)

The Idaho National Laboratory (INL) Natural Gas Products Team has designed small-scale LNG plants capable of producing a desired output of up to 30,000 gallons of LNG per day.

- These plants are small enough to fit into a cargo container and can be built to code for most locations

Idaho National Laboratory (INL) cont’d

- INL small-scale liquefiers cost between two and three million dollars to manufacture and have a very low overhead
- The plants are designed to use little or no LNG in the process and they are equipped with an integrated “stand alone” mode.
Other LNG Developments

Recent and New Applications, Experience of Cryogenic LNG Pipe
- Chart Energy & Chemicals, Inc. is installing cryogenic pipe at the Freeport LNG terminal in Texas and has installed the pipe for Train 4 of the Atlantic LNG plant in Trinidad
- Technip is trying its cryogenic hose system for ship-to-ship transfer.

Other LNG Developments cont'd
- Offshore unloading docks and cryogenic LNG piping to revolutionize LNG terminals: New large-diameter cryogenic-pipe designs reportedly allow LNG to be transported 10 or more miles with little heat influx.

Why embrace SS-LNG

- In developing markets like ours where pipeline access is limited or prohibited due to environmental issues, trucked LNG will reach isolated consumers.
- Standard, shop-fabricated liquefaction plants will grow less expensive per ton of capacity

Why embrace SS-LNG Cont’d
- Smaller-scale liquefaction plants, i.e., between 100,000 and 1.0 million metric tons per year of capacity, will allow access to cheaper gas reserves that exporting nations currently consider suboptimal.
- Floating LNG plants capable of rapid development of small gas fields and subsequent movement to new fields may become an option.

Why embrace SS-LNG Cont’d
- One of the obstacles to the widespread use of LNG as a vehicle fuel is the cost and availability of fuel. At present, LNG for commercial use in vehicles is typically produced by conventional refrigeration technologies (compressors and refrigerant loops) at large-scale liquefaction plants (peak-shaving plants, helium production plants, etc.).
- Conventional refrigeration technologies are well established, but the capital and operating costs are high for this kind of plant. Advanced refrigeration technologies are typically even more expensive to build, though less expensive to operate.
Why embrace SS-LNG Cont’d

- Purchase cost for LNG at a conventional plant varies from about $0.70 to $0.90 per diesel gallon equivalent, before taxes. Transportation costs run about $0.05 per diesel gallon equivalent per 100 miles.
- The cost of the fuel could be reduced significantly, and the availability improved, by production at local, small-scale, low-cost liquefaction plants.
- The design of the liquefaction plant will use off-the-shelf components where possible, energy inputs and moving parts will be minimized.

Why embrace SS-LNG Cont’d

- One of the advantages of the small-scale liquefaction plant is the local production of LNG at the location of use. Installations can have a fueling station adjacent to a liquefaction plant that supplies LNG to the station.
- Such an installation eliminates transportation costs and provides a continuous supply to the station’s storage tank. Multiple stations can be located around a central liquefaction plant, with only minimal transportation costs involved.

Conclusion

Small scale LNG can add real meaning to the West African Gas Pipeline Project by providing natural gas to other countries other than those currently served by the pipeline!

SOUNDS GOOD?